

# NC Employees Workplace Program Requirements for Safety and Health

## Illumination

### Scope

Lighting or lack of lighting can contribute to accidents and to visual strain. Employees and the general public need to see what they are doing and where they are going. This safety requirement and procedure provides guidelines to assist management in ensuring that proper and adequate lighting exists in state facilities and on jobsites. It includes provisions for training, discussion on lighting hazards, recommended illumination levels, night-time construction illumination requirements, and illumination measurement equipment.

### Background

This safety requirement and procedure is established in accordance with the Occupational Safety and Health Standards for the Construction Industry ([29 CFR 1926.56](#)).

### Requirement

It is the requirement of the state to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, all State facilities and construction sites will be properly and adequately lighted to minimize accidents. Where poor lighting exists or there is inadequate lighting for the job tasks, each state agency will provide sufficient lighting for the task. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

### Definitions

**Illumination:** Light falling on a surface, measured in foot candles

**Luminance:** Light emitted or reflected from a surface unit area, measured in foot/lambert

**Reflectance:** Portion of arriving light on a surface that is reflected, measured in percent

### General Provisions

This section details the provisions of this safety requirement and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Hazards
- Recommended Illumination Levels for State Facilities
- Illumination for Night-Time Construction
- Illumination Measurement

### Training

Employees will be trained to recognize improper and inadequate lighting in their workplaces. Employees will be trained at the time of their initial employment or assignment.

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## **Light Sources**

Light sources are daylight and artificial light. The types of artificial light include:

- Incandescent
- Fluorescent
- High intensity discharge (mercury and sodium vapor)

Each type of artificial light provides a different spectrum of wavelengths and is used based on lighting needs.

Lighting is also classified as general or supplemental. General lighting provides lighting to a large area. A form of supplementary lighting is task lighting. Task lighting provides additional targeted lighting for a particular task or activity.

## **Hazards**

The major hazards associated with lighting include:

- Illumination levels
- Changes in illumination levels
- Glare
- Luminous contrast

Illumination levels can either be too little or too much light. If there is too little light, employees or the public cannot see well. This could result in an error occurring because a dangerous situation may not be recognized with a corresponding decrease in an individual's reaction time.

Extremely bright light can injure receptor cells in the eye. Also, extremely bright light can cause afterimages that can obscure an individual's visual field until their receptor cells can recover. (The afterimage from a camera flashbulb or similar bright light is a common example.) Until an individual can recover from a bright light, the bright light may interfere with one's ability to detect an object.

Changes in illumination levels interfere with the ability of the eye to adjust quickly enough to permit seeing without error. Examples of changing light levels are the transition from bright outdoor light to dark interiors or from a bright area of a building to a dark one. Another example is looking at a brightly lighted task, then moving the eye to a location that is darker.

Glare is the presence of a bright light in the visual field. Direct glare occurs when the light in the visual field is a source light. An example of direct glare is the headlights of an oncoming car at night. Reflected glare occurs when a bright light reflects from a surface. Glare can lead to errors in perception and detection that result in accidents and may produce afterimages or delay visibility due to adaptation.

Luminous contrast refers to the changing light levels of an environment. For example, one may look at work on a desk that has a certain illumination.

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Shifting the eyes to a wall presents a much darker or lighter level of illumination. When there is too much difference between the two surfaces, the eyes have difficulty adapting, which may lead to visual errors.

### **Recommended Illumination Levels**

Appendix A presents minimum illumination intensities for construction areas, ramps, runways, corridors, offices, shops, and storage areas.

The values in Appendix A should be used as minimum guidelines. Actual environmental conditions and lighting needs may dictate higher illumination levels. However, higher illumination levels have to be balanced against the hazards of that lighting level (See section Light Sources).

### **Illumination Measurement**

Illumination is measured in foot-candles. The illumination meter is a convenient piece of equipment that measures illumination of any specified location. This instrument is useful in quantifying your facility's lighting area deficiencies.

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### Appendix A: Minimum Illumination Intensities

Area of Operation or Task	Foot-Candles
General construction area lighting	5
General construction areas, concrete placement, excavation and waste areas, access ways, active storage areas, loading platforms, refueling, and field maintenance areas.	3
Indoors: warehouses, corridors, hallways, and exit ways.	5
Tunnels, shafts, and general underground work areas: (Exception: minimum of 10 foot-candles is required at tunnel and shaft heading during drilling, mucking, and scaling. Bureau Mines approved cap lights shall be acceptable for use in the tunnel heading)	5
General construction plant and shops (e.g., batch plants, screening plants, mechanical and electrical equipment rooms, carpenter shops, rigging lofts and active store rooms, barracks or living quarters, locker or dressing rooms, mess halls, and indoor toilets and workrooms)	10
First Aid stations, infirmaries, and offices	30
Working with very small sized objects	200
Working with very small sized objects over a prolonged period	200-500
Performance of very prolonged and exacting Tasks	500-1000

### Resources:

OSHA for the Construction Industry, Illumination

[29 CFR 1926.56](#)